REMARKS

Claims pending in the instant application are 1-32. Claims 1-32 presently stand rejected. Claims 1-3, 7, 10, 13, 14, 16, 17, 20, 23-26, 28-32 have been amended. Claim 33 has been added. The Applicant respectfully requests reconsideration of the present application in view of the amendments and the following remarks.

35 U.S.C. § 112 Rejections

In the December 4, 2002 Office Action, claims 1-13 stand rejected under 35 U.S.C. § 112, first paragraph, because the specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims. In particular, the specification does not reasonably provide enablement for an optical output assembly optically coupled to the second output facet.

Claim 1 has been amended to accommodate this rejection. Claims 2-13 are dependent from claim 1. Accordingly, the Applicant respectfully requests that the Examiner reconsider and withdraw the § 112 rejection to claims 1-13.

In the December 4, 2002 Office Action, claims 14-24 stand rejected under 35 U.S.C. § 112, first paragraph, because the specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims. In particular, the specification does not reasonably provide enablement for an end mirror positioned in the first optical path, the end mirror and the first output facet defining an external cavity.

in the first optical path, the end mirror and the first output facet defining an external cavity.

Claim 14 has been amended to accommodate this rejection. Claims 15-24 are dependent from claim 14. Accordingly, the Applicant respectfully requests that the Examiner reconsider and withdraw the § 112 rejection to claims 14-24.

Claim Objections

In the December 4, 2002 Office Action, claims 3, 16, 17, 20, 24, 26, 29, 31, and 32 are objected to because of informalities. Claims 3, 16, 17, 20, 24, 26, 29, 31 and 32 have been amended to accommodate these objections. Accordingly, the Applicant respectfully requests that the Examiner reconsider and withdraw the claim objections.

35 U.S.C. § 102 Rejections

In the December 4, 2002 Office Action, claim 30 is rejected under 35 U.S.C. § 102(e) as being anticipated by Sesko, U.S. Patent Number 6,205,159.

Claim 30 as presently amended recites a "means for providing selective thermal control to said optical output assembly independently from said reflector."

Sesko is directed to an external cavity diode laser. However, Sesko fails to disclose, teach, or fairly suggest the Applicant's expressly recited limitation of "means for providing selective thermal control to said optical output assembly independently from said reflector."

In the December 4, 2002 Office Action, claim 30 and 31 are rejected under 35 U.S.C. § 102(b) as being anticipated by Fee, U.S. Patent Number 5,943,352.

Claim 30 as presently amended recites "an optical output assembly optically coupled to said gain medium."

Fee is directed to an optically switched laser that produces an optical output signal. (col. 3, lines 29-43). Fee discloses a laser diode that includes a reflective output device. (col. 5, lines 49-51). The laser diode outputs an optical output signal. (col. 4, lines 3-7). However, Fee fails to disclose, teach, or fairly suggest the Applicant's expressly recited limitation of "an optical output assembly coupled to said gain medium."

Therefore, since at least one of the expressly recited elements of the presently claimed invention are not disclosed, taught, or fairly suggested in the cited references, the Applicant submits that the presently claimed invention is not anticipated by Sesko or Fee. Claim 31 is a dependent claim and distinguishes over the cited references for at least the same reasons as independent claim 30 in addition to adding further limitations of its own. Accordingly, the Applicant respectfully requests that the Examiner reconsider and withdraw the § 102 rejections to claims 30 and 31.

35 U.S.C. § 103 Rejections

In the December 4, 2002 Office Action, claims 1-30 and 32 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Sesko, U.S. Patent Number 6,205,159.

The Applicant respectfully submits that the Examiner has failed to establish a prima facie case of obviousness because the cited combination does not teach or suggest all of the elements recited in the claims.

The Examiner acknowledges that Sesko "fails to teach the optical output assembly mounted on the thermally conductive substrate and the optical output assembly being configured to be thermally controlled by the thermoelectric controller via thermal conduction through the substrate."

The Examiner asserts that it would have been obvious to one of ordinary skill in the art at the time the invention was made to separate the functions of the output facet between the facet and another optical coupling device.

The Applicant respectfully submits the Examiner's assertion fails to teach or suggest at least one of the claim limitations as expressly recited by claim 1. In particular, a "said optical output assembly mounted on said thermally conductive substrate" and "said optical output assembly configured to be thermally controlled by said thermoelectric controller via thermal conduction through said substrate."

The Applicant's independent claims 14, 23, 25, 26, 28, and 30 distinguish over the cited reference for the same reasons as claim 1. Claims 2-13, 25-22, 24, 27, 29 and 32 are dependent claims and distinguish over the cited reference for at least the same reasons as their respective independent claims in addition to adding further limitations of their own. Therefore, the Applicant respectfully requests that the Examiner reconsider and withdraw the § 103 rejections to claims 1-30 and 32.

Examiner correction to the Office Action

On January 6, 2003, a representative of the Applicant spoke with the Examiner by phone regarding the December 4, 2002 Office Action. The Examiner

corrected the U.S. Patent Number to the reference Sesko et al. to read "6205159" instead of "5438579" on pages 4 and 5 of the instant Office Action.

CONCLUSION

The Applicant submits that in view of the amendments and arguments set forth herein, all instant objections/rejections have been overcome. Therefore, the Applicant respectfully requests the Examiner to reconsider and withdraw all presently outstanding objections/rejections and issue a timely Notice of Allowance in this case.

Attached hereto is a marked up version of the changes made to the claims by the current amendment. The attached page is captioned "VERSION WITH MARKINGS TO SHOW CHANGES MADE."

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Please charge our Deposit Account No. 02-2666 for any additional fee due in this matter.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN

Date: 1/8/03

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS

1. (Amended) A laser apparatus comprising:
   a. a gain medium having first and second output facets;
   b. a reflector, said reflector and said [first]second output facet defining an external cavity;
   c. an optical output assembly optically coupled to said second output facet;
   d. a thermally conductive substrate, said gain medium and said optical output assembly mounted on said thermally conductive substrate[,];
   e. a thermoelectric controller joined to said thermally conductive substrate, said gain medium and said optical output assembly configured to be thermally controlled by said thermoelectric controller via thermal conduction through said substrate; and
   f. said reflector positioned remotely from said thermally conductive substrate and said thermoelectric controller.

2. (Amended) The laser apparatus of claim 1, wherein said thermally conductive substrate has a coefficient of thermal expansion matched to that of said gain medium[;].

3. (Amended) The laser apparatus of claim 1, further comprising:
   a. a channel selector;
   b. a tuning assembly operatively coupled to said channel selector and configured to adjust said channel selector; and
   c. said channel selector and said tuning assembly positioned remotely from said substrate.

4. The laser apparatus of claim 1, further comprising a first collimating lens optically coupled to said first output facet, said first collimating

lens mounted on said thermally conductive substrate and configured to be thermally controlled by said thermoelectrical controller by thermal conduction through said substrate.

5. The laser apparatus of claim 1, wherein said output assembly comprises a second collimating lens optically coupled to said second output facet.

6. The laser apparatus of claim 4, wherein said optical output assembly further comprises and optical isolator, said optical isolator optically coupled to said second collimating lens.

7. (Amended) The laser apparatus of claim 4, wherein said optical output assembly further comprises a fiber focus lens[;], said fiber focus lens optically coupled to said optical isolator and to an optical fiber.

8. The laser apparatus of claim 1, further comprising a thermistor operatively coupled to said thermally conductive substrate and said thermoelectrical controller.

9. The laser apparatus of claim 1, further comprising a grid etalon, said grid etalon mounted on said thermally conductive substrate.

10. (Amended) The laser apparatus of claim 4, wherein said optical output assembly further comprises a coarse spectrometer[;], said spectrometer mounted on said thermally conductive substrate.

11. The laser apparatus of claim 1, wherein said gain medium, said optical output assembly, said thermally conductive substrate and said thermoelectric controller are hermetically sealed in an inert atmosphere.

12. The laser apparatus of claim 1, wherein said thermally conductive substrate comprises a material selected from aluminum nitride, silicon carbide, and a silicon carbide/aluminum nitride alloy.

13. (Amended) The external cavity laser apparatus of claim 3, wherein said reflector, said channel selector and said tuning assembly are mounted on a second[, different] substrate.

14. (Amended) An external cavity laser apparatus comprising:
    a. a gain medium having first and second output facets, said gain medium emitting a first coherent beam from said first output facet along a first optical path and a second coherent beam from said second output facet along a second optical path;
    b. an end mirror positioned in said first optical path, said end mirror and said [first]second output facet defining an external cavity;
    c. an optical output assembly positioned in said second optical path;
    d. a thermally conductive substrate, said gain medium and said optical output assembly mounted on said thermally conductive substrate;
    e. a thermoelectric controller joined to said thermally conductive substrate, said gain medium and said optical output assembly thermally coupled to said thermoelectric controller by said thermally conductive substrate; and
    f. said end mirror thermally isolated from said thermoelectric controller.

15. The external cavity laser apparatus of claim 14, wherein said thermally conductive substrate has a coefficient of thermal expansion matched to that of said gain medium.

16. (Amended) The external cavity laser apparatus of claim 14, further comprising:
    a. a channel selector positioned in said first optical path between said first output facet and said end mirror;
    b. a tuning assembly operatively coupled to said channel selector and configured to adjust said channel selector; and

c. said channel selector and said tuning assembly thermally isolated from said thermally conductive substrate and said thermoelectric controller.

17. (Amended) The external cavity laser apparatus of claim 16, wherein:
    a. said channel selector comprises a wedge etalon; and
    b. said tuning assembly comprises a stepper motor configured to positionally adjust said wedge etalon in said first optical path.

18. The external cavity laser of claim 17, wherein said tuning assembly further comprises an optical encoder configured to monitor positioning of said stepper motor and said wedge etalon.

19. The external cavity laser apparatus of claim 14, further comprising a first collimating lens positioned in said first optical path proximate to said first output facet, said first collimating lens mounted on said thermally conductive substrate and thermally coupled to said thermoelectric controller through said thermally conductive substrate.

20. (Amended) The external cavity laser apparatus of claim 14, wherein said optical output assembly comprises:
    a. a fiber focusing lens positioned in said second optical path and optically coupled to a fiber;
    b. a second collimating lens positioned in said second optical path between said second output facet and said fiber focusing lens; and
    c. an optical isolator positioned in said second optical path after said second collimating lens and before said fiber focusing lens.

21. The external cavity laser apparatus of claim 20, further comprising a grid etalon mounted on said thermal conductive substrate and thermally coupled to said thermoelectric controller, said grid etalon positioned in said second optical path after said second collimating lens.

22. An external cavity laser apparatus of claim 20, further comprising a coarse spectrometer mounted on said thermally conductive substrate and thermally coupled to said thermoelectric controller, said coarse spectrometer positioned in said second optical path after said second collimating lens.

23. (Amended) An external cavity laser apparatus comprising:
    a. a gain medium having first and second output facets, said gain medium emitting a first coherent beam from said first output facet along a first optical path and a second coherent beam from said second output facet along a second optical path;
    b. an end mirror positioned in said first optical path, said end mirror and said [first]second output facet defining an external cavity;
    c. an optical output assembly positioned in said second optical path;
    d. a thermally conductive substrate, said gain medium and said optical output assembly mounted on said thermally conductive substrate;
    e. a thermoelectric controller joined to said thermally conductive substrate, said gain medium and said optical output assembly thermally coupled to said thermoelectric controller by said thermally conductive substrate; and
    f. said end mirror positioned to allow said thermoelectric controller to thermally control said gain medium and said optical output assembly independently from said end mirror.

24. (Amended) The external cavity laser apparatus of claim 23, further comprising:
    a. a channel selector positioned in said first optical path between said first output facet and said end mirror;
    b. a tuning assembly operatively coupled to said channel selector and configured to adjust said channel selector; and
    c. said channel selector and said tuning assembly positioned to allow said thermoelectric controller to thermally control said

gain medium and said optical output assembly independently from said channel selector and said tuning assembly.

25. (Amended) A laser apparatus comprising:
    a. a gain medium having first and second output facets;
    b. an end mirror optically coupled said first output facet;
    c. an optical output assembly optically coupled to said second output facet;
    d. a first substrate, said first substrate being thermally conductive, said gain medium and said optical output assembly mounted on said first substrate;
    e. a thermoelectric controller joined to said first substrate, said gain medium and said optical output assembly configured to be thermally controlled by said thermoelectric controller via thermal conduction through said first substrate; and
    f. a second substrate, said end mirror positioned on said second substrate and thermally isolated from said thermoelectric controller.

26. (Amended) A laser apparatus, comprising:
    a. a gain medium having first and second output facets;
    b. an end mirror optically coupled to said first output facet; and
[(d)] a thermoelectric controller thermally coupled to said gain medium and configured to thermally control said gain medium independently from said end mirror.

27. The laser apparatus of claim 26, further comprising an optical output assembly optically coupled to said second output facet and thermally coupled to said thermoelectric controller, said thermoelectric controller configured to thermally control said optical output assembly.

28. (Amended) A method of selectively cooling a laser apparatus comprising:

a. providing a gain medium having first and second output facets, an end mirror optically coupled to said first output facet, and an optical output assembly optically coupled to said second output facet; and
b. thermally controlling said gain medium and said optical output assembly independently from said end mirror.

29. (Amended) The method of claim 28, wherein said thermally controlling comprises:
a. mounting said gain medium and said optical output assembly on a first, thermally conductive substrate, said first, thermally conductive substrate coupled to a thermoelectric controller; and
b. mounting said end mirror on a second substrate that is thermally isolated from said first substrate and said thermoelectric controller.

30. (Amended) A laser apparatus, comprising:
a. a gain medium;
b. a reflector, said reflector and an output facet of said gain medium defining a laser cavity;[and]
an optical output assembly optically coupled to said gain medium; and

c. means for providing selective thermal control to said [gain medium]optical output assembly independently from said reflector.

31. (Amended) The laser apparatus of claim 30, further comprising[:
(a) an optical output assembly optically coupled to said gain medium;
and

(b) means for providing selective thermal control to said optical output assembly independently from said reflector.]
means for providing selective thermal control to said gain medium independently from said reflector.

32. (Amended) The laser apparatus of claim [31]30, wherein said means for providing selective thermal control to said optical output assembly comprises:

a. a thermally conductive substrate, [said gain medium and] said optical output assembly mounted on said thermally conductive substrate[,]; and

[(e)] a thermoelectric controller joined to said thermally conductive substrate, [said gain medium and] said optical output assembly configured to be thermally controlled by said thermoelectric controller via thermal conduction through said substrate.

33. (New) The laser apparatus of claim 31, wherein said means for providing selective thermal control to said gain medium comprises:

a thermally conductive substrate, said gain medium mounted on said thermally conductive substrate; and

a thermoelectric controller joined to said thermally conductive substrate, said gain medium configured to be thermally controlled by said thermoelectric controller via thermal conduction through said substrate.